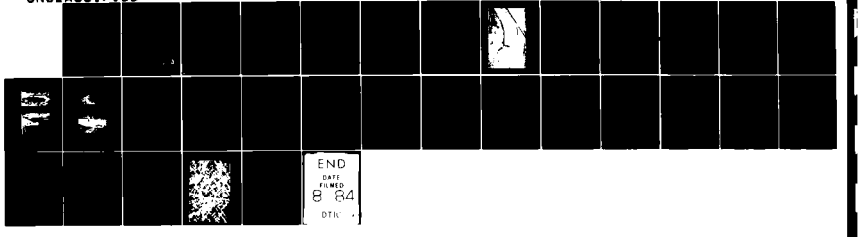
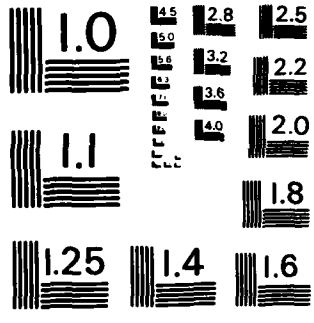
AD-A143 140 NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS 1/1
WEST BRANCH DAM (CT 0..(U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JUN 80

UNCLASSIFIED F/G 13/13 NL



END
DATE FILMED
8 84
DTIC



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS - 1963 - A

WEST BRANCH DAM
CT 00101

AD-A143 140

NAUGATUCK RIVER BASIN
TORRINGTON, CONNECTICUT

DTIC FILE COPY

This document has been approved for public release and sale; its distribution is unlimited.

DTIC ELECTE JUL 16 1984 S D E

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

84 07 11 065

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CT 00101	2. GOVT ACCESSION NO. AD-A143 140	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) West Branch Dam Naugatuck River Basin, Torrington, Conn. NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		12. REPORT DATE June 1980 13. NUMBER OF PAGES 40
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
West Branch Dam
Naugatuck River Basin
Torrington, Conn.

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The West Branch Dam has a tributary watershed of 33.3 square miles. The pond has a water surface area of 5.5 acres and a srorage capacity with the water level at the crest of the dam of 72 acre-feet. The spillway consists of 107 ft. long concrete ogee section with 8 ft. of freeboard. In addition, an intake chamber with two 42 inch sluice gates discharges to a canal which can divert water back to the river channel over a 34 ft. concrete spillway. The main spillway has a capacity of about 8,200 cfs before overtopping the right portion of the dam.The West Branch Dam is classified as "Small" in size because of its 72 acre-feet of storage capacity.

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

ROALD HAESTAD, INC.
CONSULTING ENGINEERS

37 Brookside Road • Waterbury, Conn. 06708 • Tel. 203 753-9800

June 13, 1980

The Department of the Army
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Attention: E. P. Gould
Project Management Division

Re: West Branch Dam a/k/a Church Street Dam
Torrington, Connecticut

Gentlemen:

Following field surveys and a dam failure analysis of West Branch Dam (a/k/a Church Street Dam), we conclude that the dam should be reclassified as having a low hazard potential.

We are enclosing a brief letter report substantiating our findings.

Very truly yours,

ROALD HAESTAD, INC.

By Roald Haestad
Roald Haestad

RH:cft
Encl.

ROALD J. HAESTAD No. 5749 REGISTERED PROFESSIONAL ENGINEER

Accession For
NTIS GRA&I ☒
DTIC TAB ☐
Unannounced ☐
Justification
By
Distribution/
Availability Codes
Dist | Avail and/or Special
A-1

DTIC COPY INSPECTED

DESCRIPTION

WEST BRANCH DAM A/K/A CHURCH STREET DAM
CT 00101
TOWN OF TORRINGTON, COUNTY OF LITCHFIELD
ON THE WEST BRANCH OF THE NAUGATUCK RIVER
OWNED BY: LAND TRUST, J. ERIC CHADWICK, TRUSTEE

The West Branch Dam consists of, from right to left, a 100 foot long earth embankment with an intake structure to a downstream canal, a 107 foot long concrete ogee section, and a 160 foot long earth embankment with a concrete core wall. The intake structure to the downstream canal contains two 42-inch sluice gates which discharge to the canal. The canal is separated from the river channel by an earth embankment which contains a 34 foot long auxiliary spillway. This spillway discharges into the river downstream of the dam. In the past, water from the canal would flow through a 36-inch reinforced concrete pipe (RCP) to a downstream manufacturing plant. The low level outlet, or blow-off, consists of a 48-inch RCP located to the left of the main spillway section and is controlled by a manually operated sluice gate. The dam has an overall length of 370 feet and a maximum height of 22 feet.

The dam overtopped and failed during the August 1955 flood and washed out the earth embankment to the left of the main spillway section. This section was rebuilt in 1956 as an earth embankment with a concrete core wall.

The dam is owned by Land Trust and presently serves no useful purpose to them.

The dam appears to be in fair condition and requires some work.

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

The West Branch Dam has a tributary watershed of 33.3 square miles. The pond has a water surface area of 5.5 acres and a storage capacity with the water level at the crest of the dam of 72 Acre-Feet.

The spillway consists of a 107 foot long concrete ogee section with 8 feet of freeboard. In addition, an intake chamber with two 42-inch sluice gates discharges to a canal which can divert water back to the river channel over a 34 foot concrete spillway. The main spillway has a capacity of about 8,200 cfs before overtopping the right portion of the dam.

In accordance with the Corps of Engineers' Recommended Guidelines for Safety Inspection of Dams, the West Branch Dam is classified as "Small" in size because of its 72 Acre-Feet of storage capacity. The dam's height of 22 feet is below the minimum requirement of 25 feet for a "Small" dam.

The dam overtopped and failed during the August 1955 Flood, washing out the embankment to the left of the spillway. This section was rebuilt in 1956 as an earth embankment with a concrete core wall. Since then, the Hall Meadow Brook Flood Control Dam has been constructed on the upstream watershed.

Plans for the original dam and for the 1956 reconstruction are available, but no design computations were found.

A dam breach analysis was made using the Corps of Engineers' "Rule of Thumb" guidance for estimating downstream dam failure hydrographs. Failure was assumed with the water level at the top of the dam. Full spillway flow was assumed to continue after the

TABLE OF CONTENTS

	PAGE
DESCRIPTION	1
EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES	2 - 3
OVERVIEW PHOTO	4
LOCATION PLAN	5
APPENDIX A	A1 - A2
APPENDIX B	B1 - B2
APPENDIX C	C1 - C15
APPENDIX D	

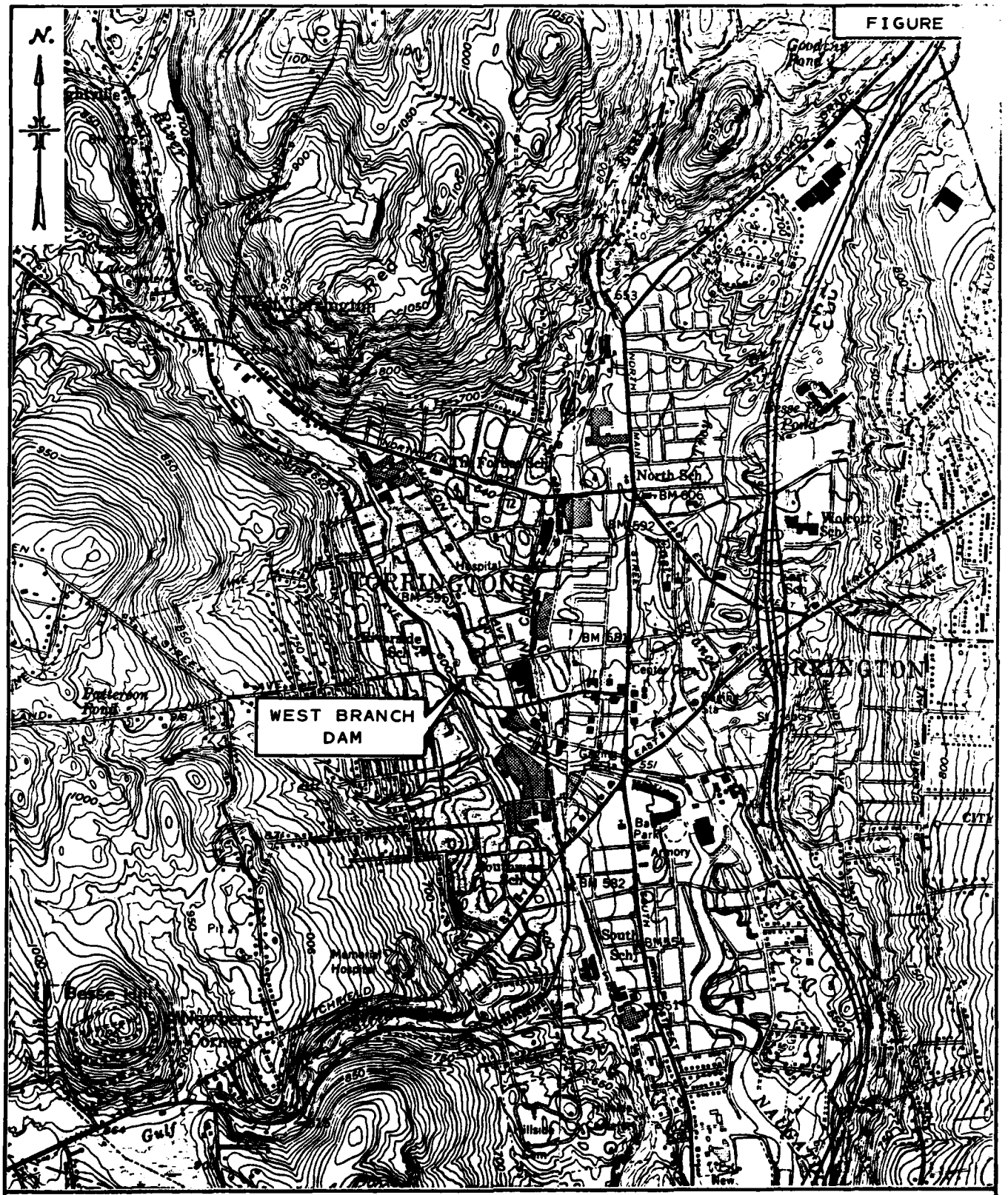
OVERVIEW PHOTO

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST BRANCH DAM - CT00101
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		WEST BRANCH OF NAUGATUCK RIVER
		TORRINGTON, CONNECTICUT DATE: 19 APRIL '80

dam breach. Thus the spillway capacity was added to the dam breach flow and routed downstream. The above assumption was consistent with the 1955 failure of the dam.

The peak dam breach discharge including spillway flow was calculated to be 23,500 cfs. The flood was routed to a point 1000 feet downstream of the South Main Street bridge where the flow was well within the channel limits. Beyond this point the channel increases in size. The flood was found not to overflow the channel at any of the sections. Loss of life or significant property damage from a failure of the West Branch Dam is considered unlikely. Therefore, the dam is classified as "Low" potential hazard. See Appendix C for Calculations and Plan showing Limits of Potential Flooding.

FIGURE



LOCATION PLAN

WEST BRANCH DAM
TORRINGTON, CONNECTICUT

SCALE: 1" = 2000'

ROALD HAESTAD, INC. WEST TORRINGTON QUADRANGLE 1972

Appendix A

Engineering Data

LIST OF REFERENCES

Reference Nos. 1 through 4 are located at The Anaconda American Brass Company, Waterbury Office, 414 Meadow Street, Waterbury, Connecticut.

Reference No. 5 is located at the Department of Environmental Protection, Office of the Superintendent of Dams, State Office Building, Hartford, Connecticut.

1) Plans, "Church Street Dam, Coe Brass Branch, Torrington, Connecticut", The American Brass Company, Mechanical Department, Waterbury, 1920.

2) "Plan Showing Church Street Dam Area After Flood of August 19, 1955, Torrington Division, Torrington, Connecticut", The American Brass Company, Engineering Department, Waterbury, Connecticut, September, 1955.

3) Plans, "Proposed Replacement of East Portion of Church Street Dam, Torrington Division, Torrington, Connecticut", The American Brass Company, Engineering Department, September, 1955.

4) Miscellaneous Plans of Dam

5) Miscellaneous correspondence concerning failure of dam during 1955 Flood and subsequent repairs.

Appendix B

Photographs

Note: For Photo Locations,
See Figure 2, Appendix A

PHOTO NO. 1

SPILLWAY AND RIGHT TRAINING WALL*

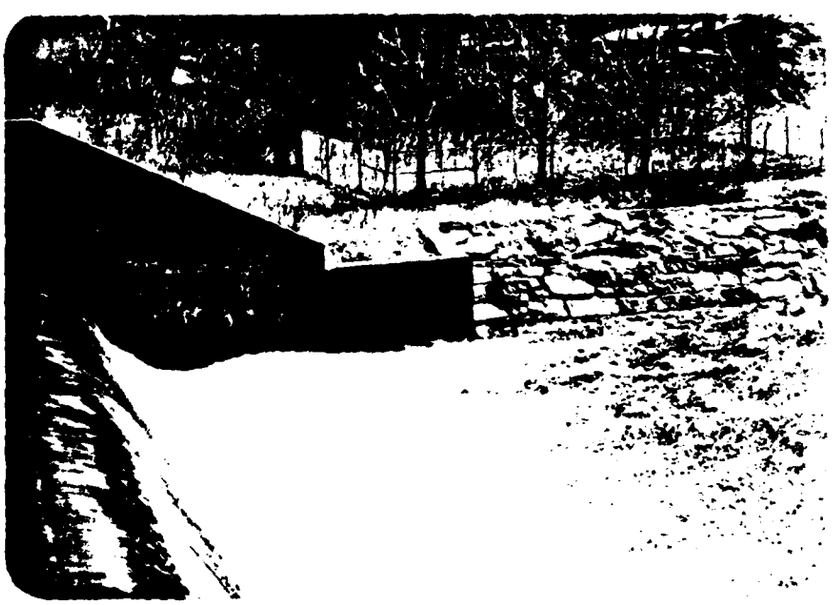


PHOTO NO. 2

LEFT TRAINING WALL AND OUTLET FROM BLOWOFF

*5 APRIL '80

U.S ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST BRANCH DAM W. BRANCH OF NAUG. RIV. TORRINGTON, CONNECTICUT CT 00101 19 APRIL '80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

PHOTO NO. 3

DOWNSTREAM SLOPE OF DIKE
BETWEEN CANAL AND RIVER CHANNEL

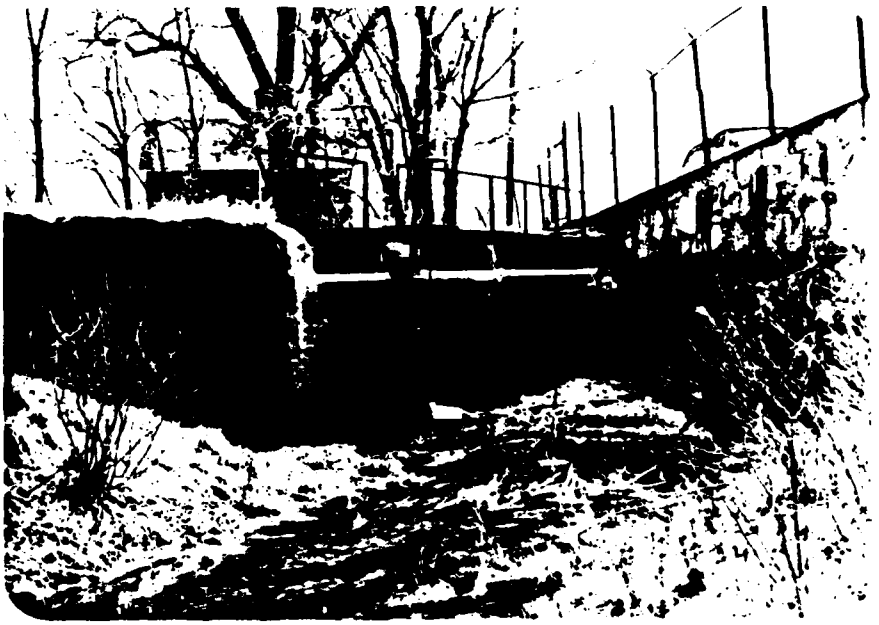


PHOTO NO. 4

OVERFLOW SPILLWAY AND OUTLET GATE
AT END OF CANAL.

U.S.ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASSACHUSETTS	NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	WEST BRANCH DAM W. BRANCH OF NAUG. RIV. TORRINGTON, CONNECTICUT CT 001 19 APR 80
ROALD HAESTAD, INC. CONSULTING ENGINEERS WATERBURY, CONNECTICUT		

Appendix C

Hydraulic/Hydrologic Computations

BY SAL DATE 4/28/80 **ROALD HAESTAD, INC.** SHEET NO 1 OF 1

CONSULTING ENGINEERS

CKD BY DAS DATE 5/12/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-18

SUBJECT WEST BRANCH RRM - Dam breach Calculations

S = Storage at time of failure = Storage at spillway level + Storage of freeboard

$S = [5.5 \text{ acres} \times 5 \text{ ft}] + [5.5 \text{ acres} \times 8 \text{ ft}]$

ESTIMATE AVERAGE DEPTH = 5'

$S = 71.5$ use 72 ac-ft

FREEBOARD = 8'

Q_{pl} = Peak Failure Outflow = $8/27\ W_b \sqrt{g}\ Y_o^{3/2}$

W_b = Breach Width = 40% of dam length across river at mid height = 0.4(220) = 88 ft

Y_o = Total height from river bed to pool level at time of failure = 22 ft

$Q_{pl} = 8/27\ (88)(\sqrt{32.2})(22)^{3/2} = 15,268$ use 15,270 cfs

In the 1955 flood the West Branch Dam failed. The failure occurred at the embankments and the spillway was left intact. Therefore a similar failure was assumed and 100% of the spillway discharge at time of failure is added to the Peak Failure Outflow to determine the total discharge.

Spillway Discharge at time of failure = $CLH^{3/2}$

$C = 3.4$ $L = 107'$ $H = 8'$

$Q_{peak} = 3.4(107)(8)^{3/2} = 8,232$ use 8,230 cfs

Total Discharge = $Q_{pl} + Q_{peak}$

$= 15,270 \text{ cfs} + 8,230 \text{ cfs} = 23,500 \text{ cfs}$

BY SAL DATE 5/9/80 ROALD [illegible] INC. SHEET NO 2 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 1A

(MAIN CHANNEL)

H	W	A	R	S	V	Q
1.0	44	22	.50	.0110	3.49	76
2.0	80	87	1.09	.0110	5.88	510
3.0	83	167	2.01	.0110	8.86	1478
4.0	86	249	2.88	.0110	11.27	2809
5.0	90	334	3.72	.0110	13.35	4454
6.0	93	420	4.51	.0110	15.20	6384
7.0	96	509	5.28	.0110	16.87	8580
8.0	100	599	6.01	.0110	18.40	11025
9.0	103	692	6.72	.0110	19.81	13711
10.0	106	787	7.40	.0110	21.13	16629
11.0	110	884	8.06	.0110	22.37	19773
12.0	112	983	8.75	.0110	23.63	23217
13.0	114	1082	9.46	.0110	24.90	26927
14.0	116	1181	10.15	.0110	26.09	30802

MANNING COEFFICIENT=N=.0280

BY SA' DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 3 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM-Flood Routing

SECTION NUMBER 1B

(RIGHT OVERBANK)

H	W	A	R	S	V	Q
12.0	25	6	.24	.0110	3.81	23
13.0	75	55	.73	.0110	7.93	435
14.0	83	134	1.60	.0110	13.35	1787

MANNING COEFFICIENT=N=.0160

BY SAL DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 4 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 1

(TOTAL SECTION)

	AREA			DISCHARGE		
H	A	B	TOTAL	A	B	TOTAL
1.0	22	0	22	76	0	76
2.0	87	0	87	510	0	510
3.0	167	0	167	1478	0	1478
4.0	249	0	249	2809	0	2809
5.0	334	0	334	4454	0	4454
6.0	420	0	420	6384	0	6384
7.0	509	0	509	8580	0	8580
8.0	599	0	599	11025	0	11025
9.0	692	0	692	13711	0	13711
10.0	787	0	787	16629	0	16629
11.0	884	0	884	19773	0	19773
12.0	983	6	989	23217	23	23240
13.0	1082	55	1136	26927	435	27362
14.0	1181	134	1314	30802	1787	32588

STORAGE AT TIME OF FAILURE=S= 72 AC. FT.
LENGHT OF REACH=L= 500 FT.

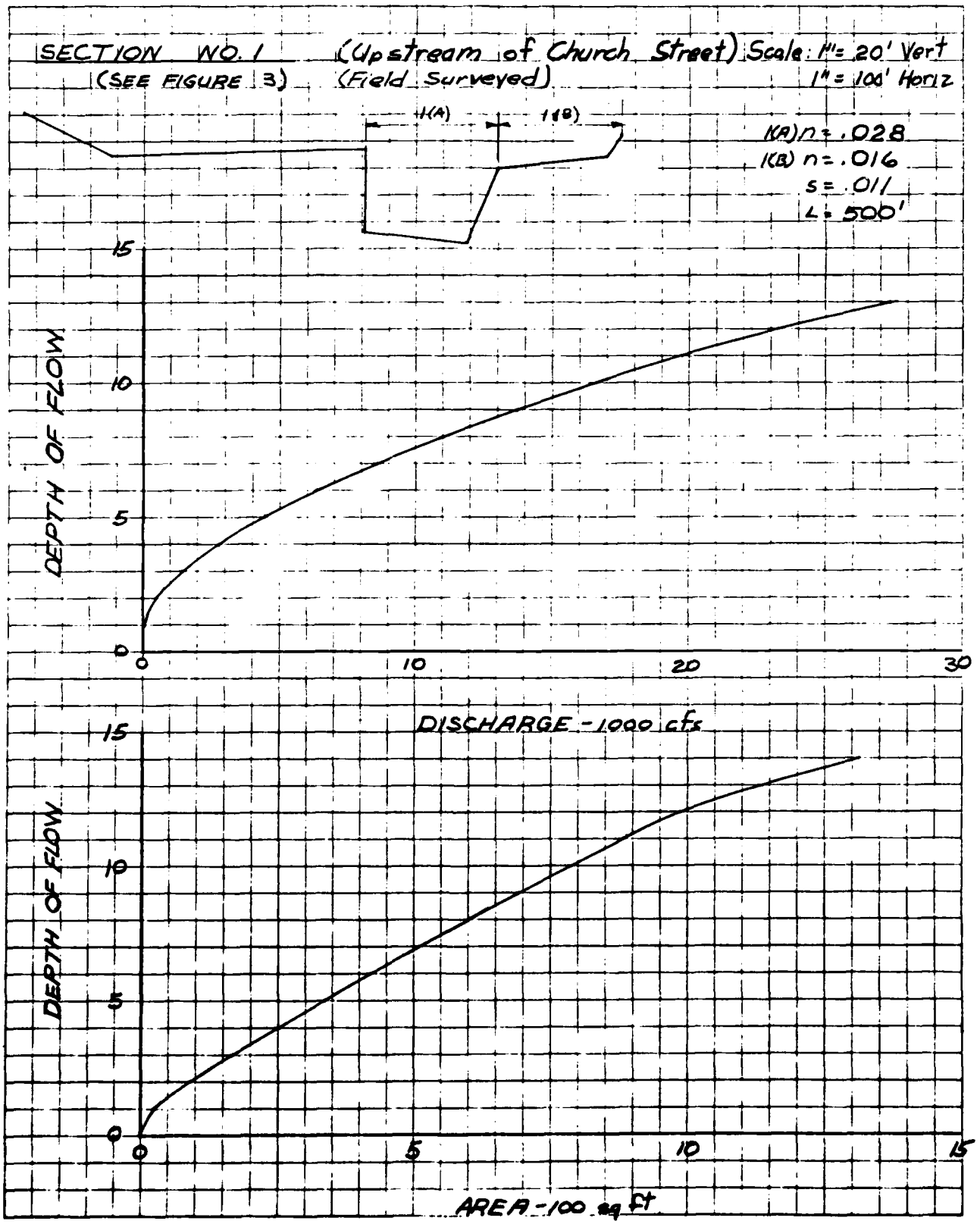
INFLOW INTO REACH=QP1=23500 CFS
DEPTH OF FLOW=H1= 12.1 FT.
CROSS SECTIONAL AREA=A1= 997 SQ. FT.
STORAGE IN REACH=V1= 11.4 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)=19764 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 11.0 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 884 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 10.1 AC. FT.

REACH OUTFLOW=QP2=19977 CFS
DEPTH OF FLOW=H2= 11.1 FT.

BY SAL DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 5 OF 14
CONSULTING ENGINEERS
CKD BY DLS DATE 6/5/80 [illegible] Brookside Road - Waterbury, Conn. 06708 JOB NO 049-18

SUBJECT WEST BRANCH DAM - Flood Routing



SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 2

(A-SQR BRIDGE)

H	W	A	R	S	V	Q
1.0	64	59	.92	.0160	7.75	456
2.0	66	121	1.84	.0160	12.26	1482
3.0	68	183	2.70	.0160	15.84	2897
4.0	70	245	3.51	.0160	18.87	4622
5.0	72	307	4.27	.0160	21.53	6606
6.0	74	369	5.00	.0160	23.89	8815
7.0	76	431	5.69	.0160	26.03	11218
8.0	78	493	6.34	.0160	27.98	13794
9.0	80	555	6.95	.0160	29.77	16524
10.0	82	617	7.54	.0160	31.43	19391
11.0	84	679	8.10	.0160	32.97	22384
12.0	86	741	8.64	.0160	34.40	25490
13.0	88	803	9.15	.0160	35.74	28700
14.0	90	865	9.63	.0160	37.00	32004
15.0	92	927	10.10	.0160	38.18	35396
16.0	94	989	10.54	.0160	39.30	38867

MANNING COEFFICIENT=N=.0230
STORAGE AT TIME OF FAILURE=S= 72 AC. FT.
LENGHT OF REACH=L= 2000 FT.

INFLOW INTO REACH=QP1=19977 CFS
DEPTH OF FLOW=H1= 10.2 FT.
CROSS SECTIONAL AREA=A1= 629 SQ. FT.
STORAGE IN REACH=V1= 28.9 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)=11960 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 7.3 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 449 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 20.6 AC. FT.

REACH OUTFLOW=QP2=13107 CFS
DEPTH OF FLOW=H2= 7.7 FT.

BY SAL DATE 5/9/80 **ROALD HAESTAD, INC.** SHEET NO 7 OF 14

CONSULTING ENGINEERS

CKD BY RHS DATE 5/12/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-18

SUBJECT WEST BRANCH DAM - Flood Routing

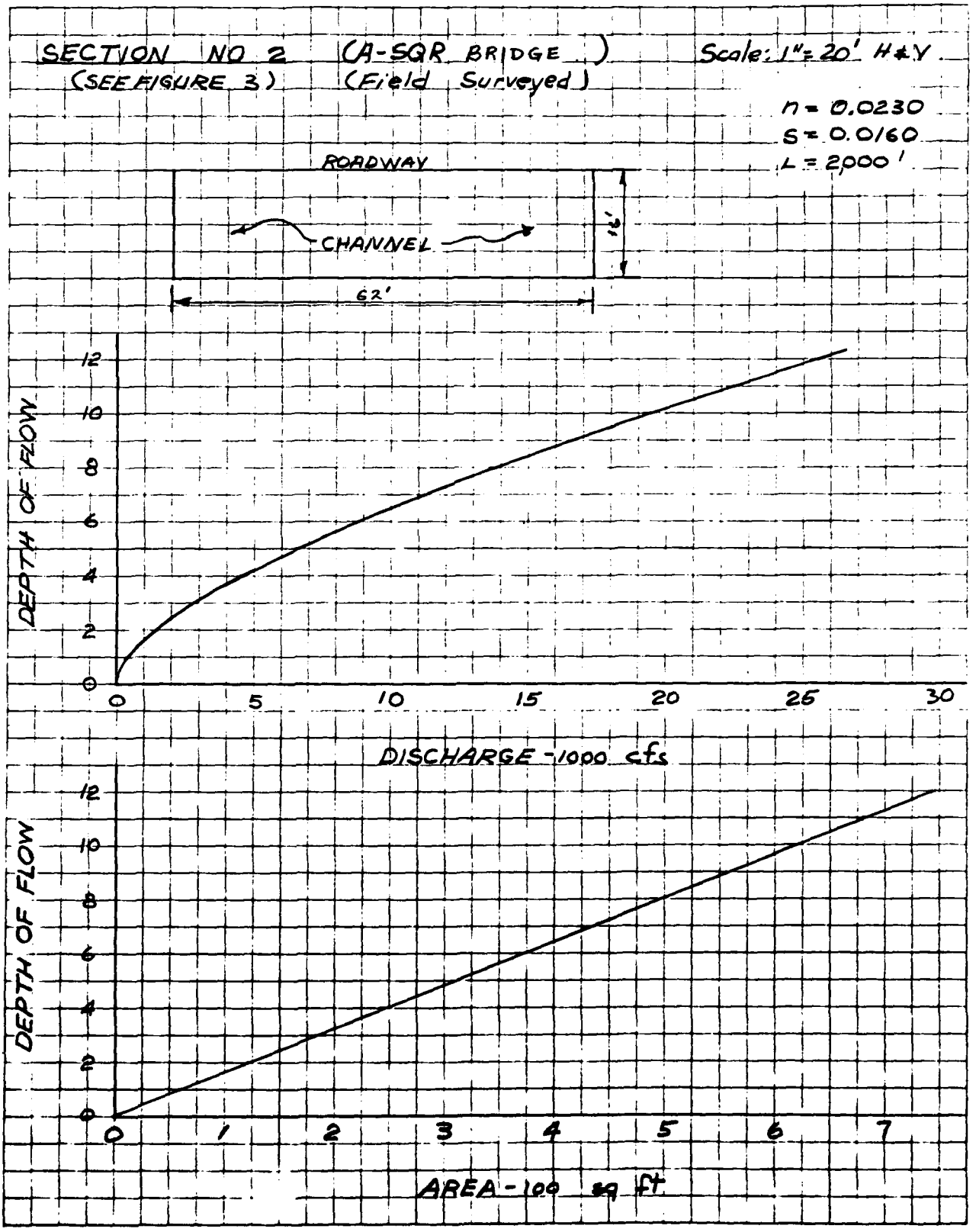
SECTION NO 2 (A-SQR BRIDGE) Scale: 1" = 20' H & V

(SEE FIGURE 3) (Field Surveyed)

n = 0.0230

S = 0.0160

L = 2,000'



BY SAL DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 8 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 3A

(MAIN CHANNEL)

H	W	A	R	S	V	Q
1.0	19	9	.47	.0100	3.48	31
2.0	37	35	.95	.0100	5.52	194
3.0	56	79	1.42	.0100	7.23	573
4.0	74	141	1.90	.0100	8.76	1233
5.0	83	217	2.62	.0100	10.86	2354
6.0	85	294	3.47	.0100	13.11	3860
7.0	87	372	4.29	.0100	15.09	5621
8.0	89	451	5.07	.0100	16.88	7606
9.0	91	529	5.83	.0100	18.50	9794
10.0	93	608	6.55	.0100	20.00	12164
11.0	95	687	7.24	.0100	21.39	14701
12.0	97	767	7.91	.0100	22.69	17393
13.0	99	846	8.55	.0100	23.90	20225
14.0	101	926	9.17	.0100	25.04	23187

MANNING COEFFICIENT=N=.0260

BY SAL DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 9 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 3B

(LEFT OVERBANK)

H	W	A	R	S	V	Q
12.0	39	15	.39	.0100	4.97	76
13.0	89	77	.87	.0100	8.47	656
14.0	140	189	1.35	.0100	11.37	2154

MANNING COEFFICIENT=N=.0160

BY SAL DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 10 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 3

(DST OF GAGING ST)

	AREA			DISCHARGE		
H	A	B	TOTAL	A	B	TOTAL
1.0	9	0	9	31	0	31
2.0	35	0	35	194	0	194
3.0	79	0	79	573	0	573
4.0	141	0	141	1233	0	1233
5.0	217	0	217	2354	0	2354
6.0	294	0	294	3860	0	3860
7.0	372	0	372	5621	0	5621
8.0	451	0	451	7606	0	7606
9.0	529	0	529	9794	0	9794
10.0	608	0	608	12164	0	12164
11.0	687	0	687	14701	0	14701
12.0	767	15	782	17393	76	17469
13.0	846	77	924	20225	656	20881
14.0	926	189	1115	23187	2154	25340

STORAGE AT TIME OF FAILURE=S= 72 AC. FT.
LENGHT OF REACH=L= 500 FT.

INFLOW INTO REACH=QP1=13107 CFS
DEPTH OF FLOW=H1= 10.4 FT.
CROSS SECTIONAL AREA=A1= 638 SQ. FT.
STORAGE IN REACH=V1= 7.3 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)=11774 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 9.8 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 595 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 6.8 AC. FT.

REACH OUTFLOW=QP2=11818 CFS
DEPTH OF FLOW=H2= 9.9 FT.

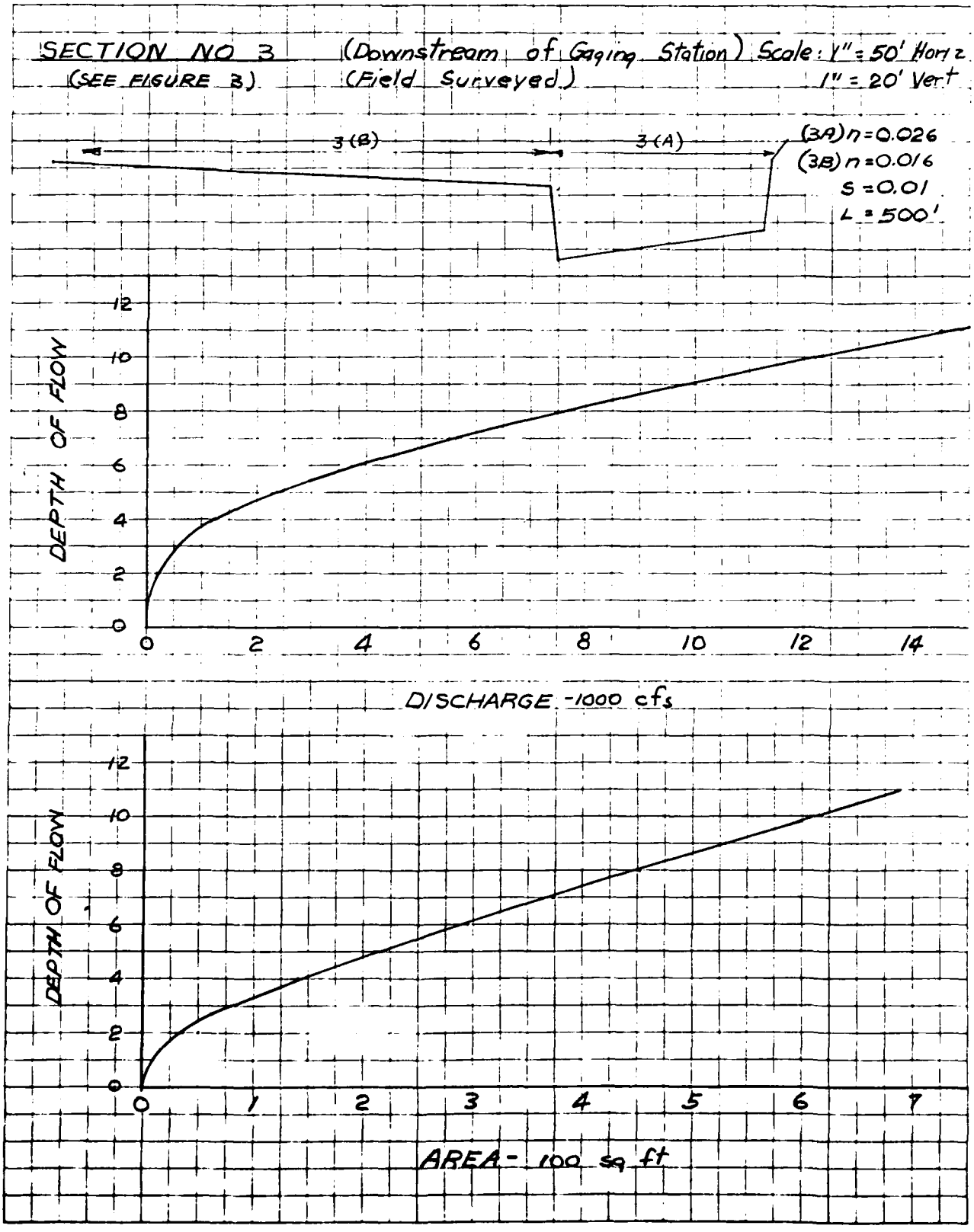
BY SAL DATE 5/9/80 **ROALD HAESTAD, INC.** SHEET NO 11 OF 14

CONSULTING ENGINEERS

CKD BY DLS DATE 5/12/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-18

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NO 3 (Downstream of Gaging Station) Scale: 1" = 50' Horiz
(SEE FIGURE 3) (Field Surveyed) 1" = 20' Vert



BY SAL DATE 5/9/80 ROALD HAESTAD, INC. SHEET NO 12 OF 14

CKD BY DLS DATE 6/5/80 CONSULTING ENGINEERS JOB NO 49-018

SUBJECT WEST BRANCH DAM - Flood Routing

SECTION NUMBER 4

(TYPICAL SECTION)

H	W	A	R	S	V	Q
1.0	91	63	.69	.0080	3.14	197
2.0	96	156	1.62	.0080	5.56	869
3.0	101	254	2.51	.0080	7.45	1889
4.0	106	356	3.36	.0080	9.04	3216
5.0	110	462	4.18	.0080	10.45	4827
6.0	115	572	4.97	.0080	11.73	6711
7.0	120	687	5.73	.0080	12.89	8860
8.0	125	806	6.46	.0080	13.98	11270
9.0	130	930	7.18	.0080	14.99	13939
10.0	134	1058	7.88	.0080	15.95	16866
11.0	139	1190	8.56	.0080	16.85	20051
12.0	144	1326	9.22	.0080	17.71	23496
13.0	147	1466	9.96	.0080	18.64	27333
14.0	151	1608	10.68	.0080	19.53	31417
15.0	154	1753	11.39	.0080	20.38	35726

MANNING COEFFICIENT=N=.0330
STORAGE AT TIME OF FAILURE=S= 72 AC. FT.
LENGHT OF REACH=L= 1000 FT.

INFLOW INTO REACH=QP1=11818 CFS
DEPTH OF FLOW=H1= 8.2 FT.
CROSS SECTIONAL AREA=A1= 832 SQ. FT.
STORAGE IN REACH=V1= 19.1 AC. FT.

TRIAL REACH OUTFLOW=QP(TRIAL)= 8682 CFS
TRIAL DEPTH OF FLOW=H(TRIAL)= 6.9 FT.
TRIAL CROSS SECTIONAL AREA=A(TRIAL)= 678 SQ. FT.
TRIAL STORAGE IN REACH=V(TRIAL)= 15.6 AC. FT.

REACH OUTFLOW=QP2= 8972 CFS
DEPTH OF FLOW=H2= 7.0 FT.

BY ...SAL.... DATE ..5/9/80.. **ROALD HAESTAD, INC.** SHEET NO ...13.... OF ...14....

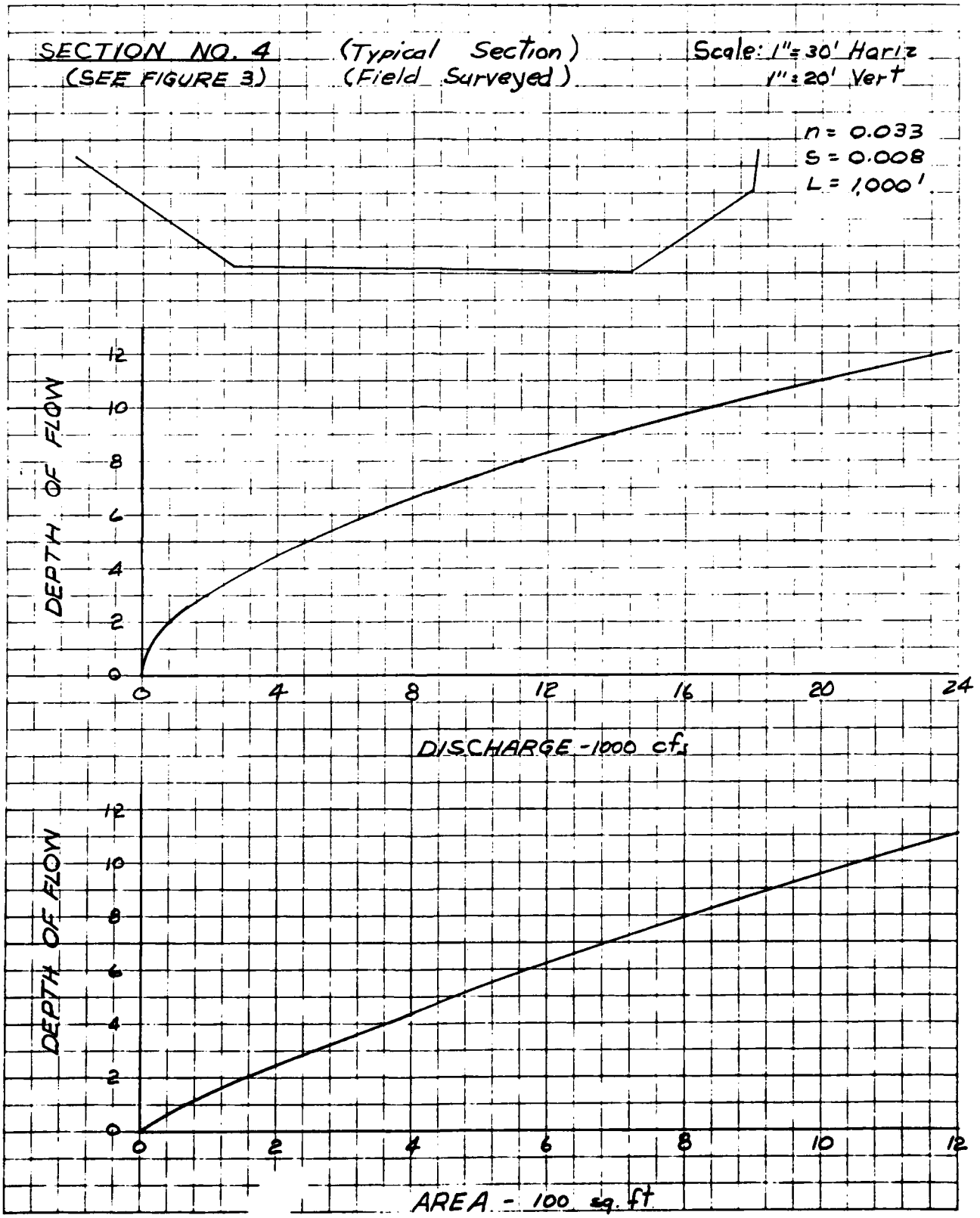
CONSULTING ENGINEERS

CKD BY ..DLS.. DATE ...5/12/80... 37 Brookside Road - Waterbury, Conn. 06708 JOB NO ...049-18.....

SUBJECT ...WEST...BRANCH...DAM:...Flood...Routing.....

SECTION NO. 4 (Typical Section) Scale: 1" = 30' Horiz
(SEE FIGURE 3) (Field Surveyed) 1" = 20' Vert

n = 0.033
S = 0.008
L = 1,000'



BY SAL DATE 4/28/80 **ROALD HAESTAD, INC.** SHEET NO 14 OF 14

CONSULTING ENGINEERS

CKD BY DLS DATE 5/12/80 37 Brookside Road - Waterbury, Conn. 06708 JOB NO 049-18

SUBJECT WEST BRANCH DAM - Areas

Planimeter Readings:

1) Surface Area; Third = 1.94 sq in 0.06
First = 1.82 sq in 0.06
Start = 1.76 sq in

$$0.06\ in^2 \times \frac{(2000\ ft)^2}{in^2} \times \frac{1\ acre}{43{,}560\ ft^2} = 5.5\ acres$$

2) Watershed Area; Third = 10.28 sq in 2.90
First = 4.45 sq in 2.86
Start = 1.59 sq in

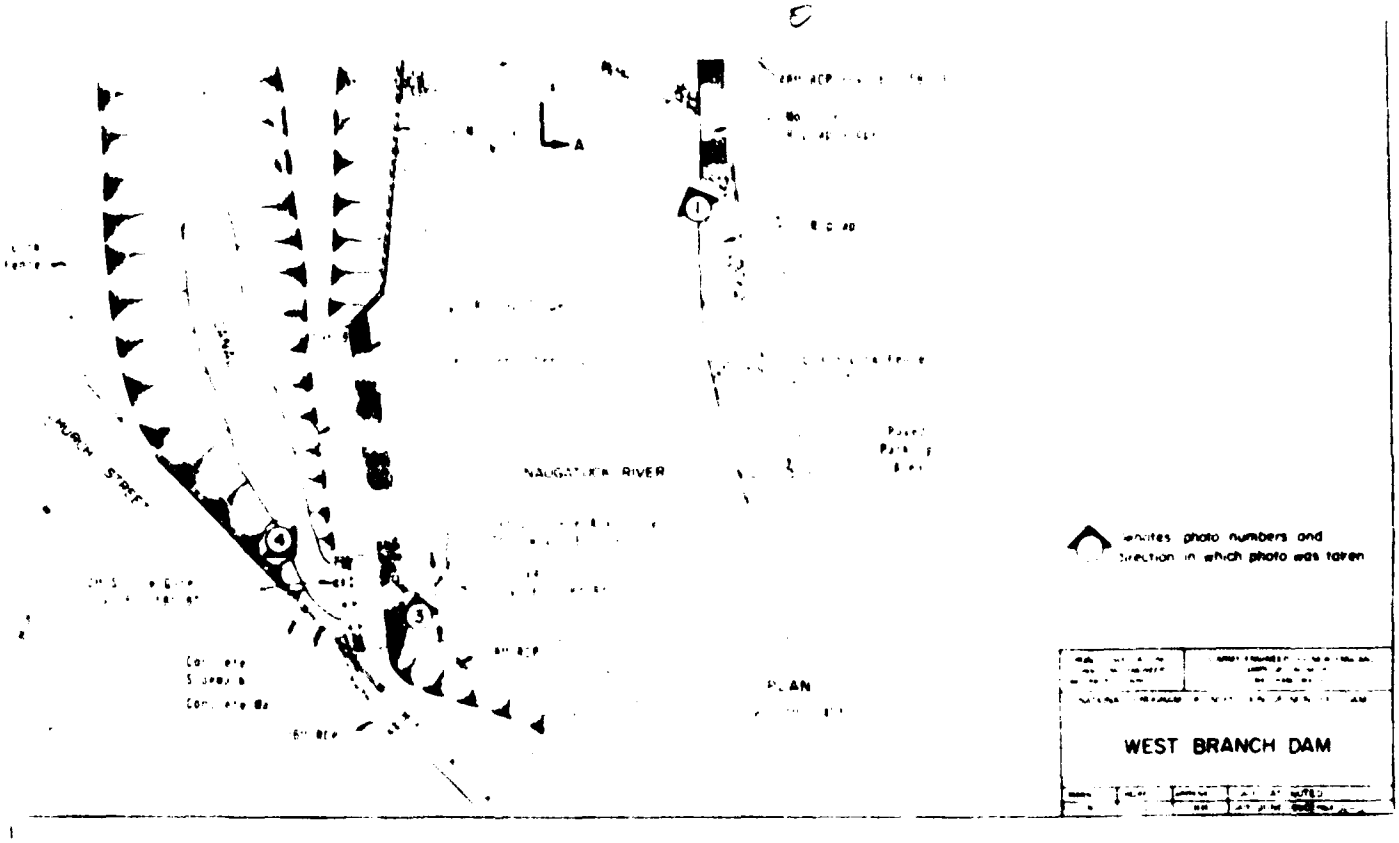
$$2.90\ in^2 \times \frac{(2000\ ft)^2}{in^2} \times \frac{1\ sq\ mi}{(5{,}280\ ft)^2} = 0.42\ sq\ mi$$

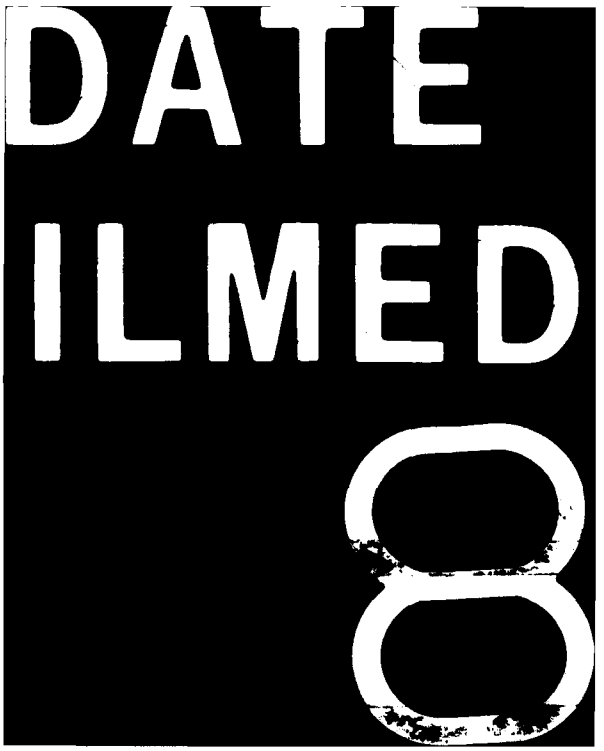
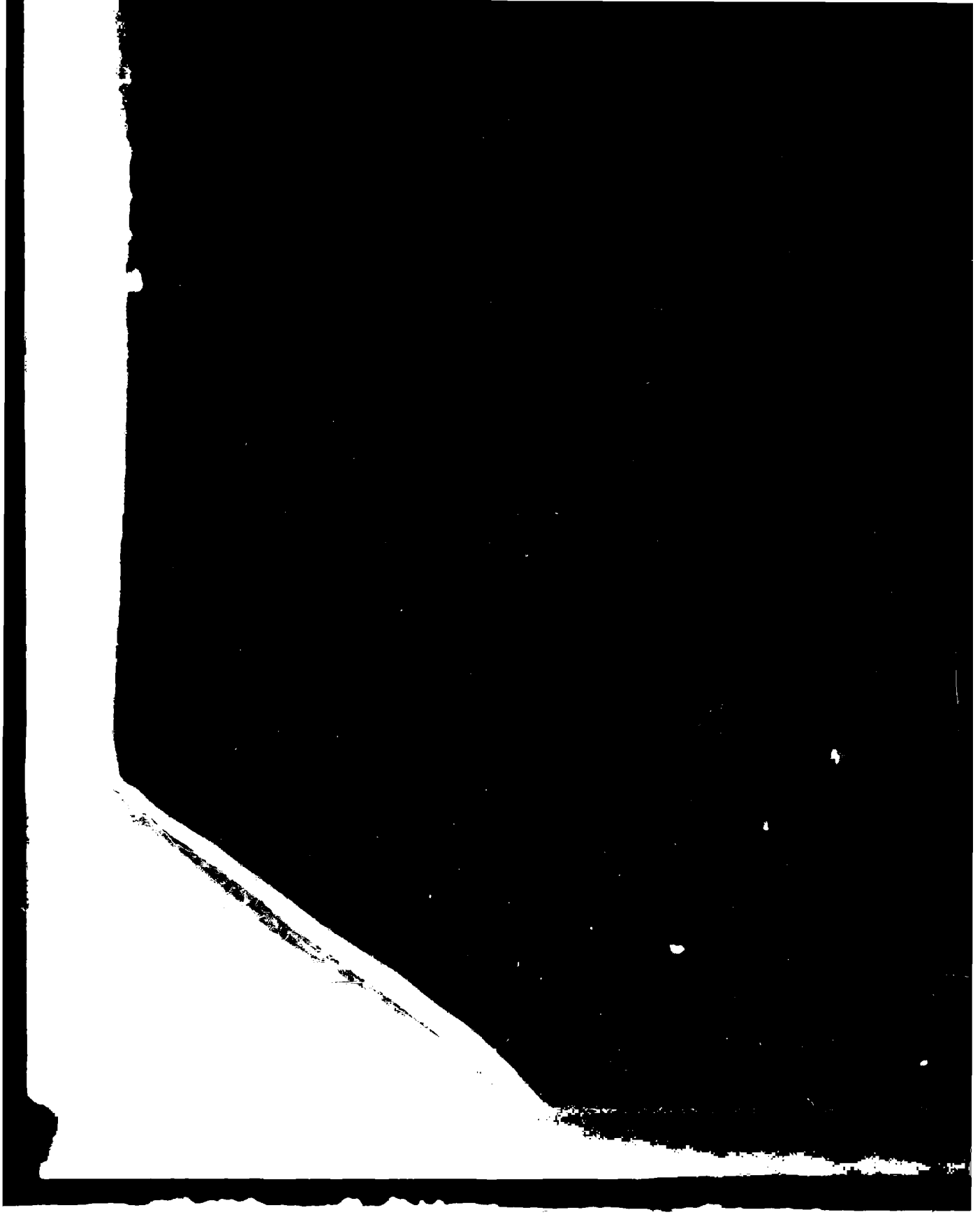
The 0.42 sq mi watershed consists of the watershed located between the Dam and Gaging Station. The watershed for the West Branch Dam is equal to the watershed for the Gaging Station minus the 0.42 sq mi watershed. From the 'U.S. Geological Survey Water-Data Report CT-76-1', the Gaging Station Watershed is equal to 33.7 sq. mi.

West Branch Watershed = 33.7 sq mi - 0.42 sq mi = 33.28

use 33.3 sq mi

750


NAUGATUCK RIVER
PLAN
WEST BRANCH DAM


DATE
ILMED